REMARKS

Claims 1 – 29 are pending and under consideration in the above-identified application, and Claims 30 - 60 were previously cancelled.

In the Final Office Action, Claims 1 – 29 were rejected.

In this Amendment, Claim 1 has been amended. No new matter has been introduced as a result of this Amendment.

Accordingly, Claims 1 – 29 remain at issue.

I. Interview Summary

Applicant thanks the Examiner for the courtesy extended to Applicant's agent, Kader Gacem, for the interview held on Tuesday April 14, 2009.

During the interview, Applicant's agent and the Examiner discussed the rejections under 35 U.S.C § 103(a). The Examiner and Applicant's agent discussed Claim 1.

With respect to Claim 1, Applicant's Agent stated that the claim rejections relied on whole sections of Chandrasekaran disclosure and failed to specifically identify elements disclosed in Chandrasekaran that relate to the elements recited in Claim 1. Applicant's Agent added that Chandrasekaran fails to disclose that first and second tier objects belong to the same storage processor, with the first tier objects reflecting a relationship between the physical block addresses and one or more logical partitions of virtual volume data, and the second tier objects reflecting a logical configuration of the virtual volume. In reply, the Examiner pointed to the discussion on data segments, virtual representation of a storage device and physical partition addresses, found in column 4 of Chandrasekaran. Applicant's Agent respectfully disagreed with the Examiner's reply and indicated that to further prosecution the response to the Office Action will include claim amendment and remarks that will clarify the difference between the claimed invention and Chandrasekaran, specifically the logical connections that link first and second tier objects across different storage processors.

II. 35 U.S.C. § 103 Obviousness Rejection of Claims

Claims 1 - 29 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Chandrasekaran (U.S. Patent No. 6,948,044) in view of Official Notice.

Although, Applicant respectfully traverses this rejection, to further prosecution, Claim 1 has been amended to clarify the invention and remove any ambiguities that may have been at the basis of this rejection.

Claim 1 is directed to a system for dynamically configuring a virtual volume associated with a host system.

In relevant part, Claim 1 recites:

> "… a set of storage devices, each of which includes physical block addresses for storing data associated with the virtual volume; and
> a network switch system connecting the host system and the set of storage devices, and including:
> a set of storage processors each maintaining virtual volume objects comprising first tier objects reflecting a relationship between the physical block addresses and one or more logical partitions of virtual volume data, and second tier objects reflecting a logical configuration of the virtual volume,
> wherein,
> the network switch system uses the virtual volume objects to dynamically update the virtual volume during runtime of the network switch system, and
> the first tier objects have logical connections to both local second tier objects associated with a shared storage processor and to remote second tier objects associated with at least another storage processor."

Applicant's FIGs. 6 and 7B are illustrative examples that embody principles of the invention. The embodiment of 7B comprises a block diagram of network switch system 120 including a virtual volume map including the T2 and T1 objects distributed by virtual coherency manager (VCM) 337 corresponding to the tree configured by master virtualization state manager (MVSM) 416. As shown, VCM 337 distributes two T2 striping objects 705 and 715 to storage processors (SP) 420 and 430, respectively, based on the connectivity between SPs 420, 430 and hosts 760 and 770. Further, VCM 337 maps the mirroring portion of the striping over mirroring type volume configuration by assigning T2 mirroring objects 710 and 711 to SP 420 and T2 mirroring objects 716 and 717 to SP 430. T2 mirroring objects 716 and 717 reflect the mirrored copies of T2 mirroring objects 710 and 711, respectively. As shown in Fig. 7B, VCM 337 also establishes the references from each of the T2 layer objects. These references are shown in Fig. 7B as dotted lines flowing from T2 objects 705-717 to sibling objects (e.g., T1 or T2 objects) 710-750. For example, T1 partitioning object 720 has multiple references from mirrored copies T2 mirroring objects 710 and 716. Accordingly, VCM 337 creates a system definition view of the virtual volume object mappings that are used by network switch system 120 for managing the configured virtual volume created by MVSM 416.

This clearly unlike Chandrasekaran in view of Official Notice.

M.P.E.P. § 2142, 8th Ed., Rev. 6 (Sept. 2007) (internal citation and inner quotation omitted). "The mere fact that references *can* be combined or modified does not render the resultant combination obvious unless the results would have been predictable to one of ordinary skill in the art." M.P.E.P. § 2143.01(111) (emphasis in original). "All words in a claim must be considered in judging the patentability of that claim against the prior art." M.P.E.P. § 2143.03. "In determining the differences between the prior art and the claims, the question under 35 U.S.C. 103 is not whether the differences *themselves* would have been obvious, but whether the claimed invention *as a whole* would have been obvious. M.P.E.P. § 2141.02(1) (emphasis in original).

"[T]he framework for objective analysis for determining obviousness under 35 U.S.C. § 103 is stated in *Graham v. John Deere* Co., 383 U.S. 1, 148 U.S.P.Q. 459 (1966). . . . The factual inquiries . . . [include determining the scope and content of the prior art and] . . . [a]scertaining the differences between the claimed invention and the prior art." M.P.E.P. § 2141(11). "Office personnel must explain why the difference(s) between the prior art and the claimed invention would have been obvious to one of ordinary skill in the art." M.P.E.P. § 2141(111).

The Supreme Court in *KSR Intl* Co. v. *Teleflex Inc.,* 82 U.S.P.Q.2d 1385 (U.S. 2007) held that "[t]here is no necessary inconsistency between the idea underlying the TSM [teaching, suggestion, motivation] test and the *Graham* analysis." M.P.E.P. §2141 (rev. 6, Sept. 2007), citing *KSR* at 82 U.S.P.Q. 2d at 1396. Applicant understands this to mean that when applicable, as here, TSM reasoning may still be applied not only by an examiner but also by Applicant to refute a § 103 rejection.

In the Office Action, Claims 1-29 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Chandrasekaran. However, Chandrasekaran does not disclose each and every element of Applicants' claimed invention. In the Office Action, Chandrasekaran is asserted to teach "first tier objects reflecting a relationship between the physical block addresses and one or more logical partitions of virtual volume data, and second tier objects reflecting a logical configuration of the virtual volume." Chandrasekaran stresses the importance of mapping virtual disk addresses to physical partitions in a virtual disk while recognizing the mirroring, striping, and concatenation characteristics associated with the virtual disk. Chandrasekaran uses indices to allow direct access of a physical partition upon identification of a virtual disk address. See Chandrasekaran Abstract. Accordingly, Chandrasekaran identifies the need to manage information related to virtualization of physical storage devices, including partitioning, striping and mirroring.

However, Chandrasekaran does not teach or suggest that each storage processor maintains virtual volume objects comprising first tier objects reflecting a relationship between the physical block addresses and one or more logical partitions of virtual volume data, and second tier objects reflecting a logical configuration of the virtual volume and that "the first tier objects have logical connections to both local second tier objects associated with a shared storage processor and to remote second tier objects associated with at least another storage processor." See amended Claim 1.

The Office Action cites column 4, lines 1 - 56, column 1, line 52 - column 2, line 6, and column 3, line 26 - 27, as support for using first and second tiered objects. However, in none of these paragraphs, nor elsewhere in Chandrasekaran, is described a set of storage processors each maintaining virtual volume objects comprising first tier objects and second tier objects and that the first tier objects have logical connections to both local second tier objects associated with a shared storage processor and to remote second tier objects associated with at least another storage processor," as required by Claim 1.

Therefore, amended Claim 1 recites other elements that are not found in Chandrasekaran.

Whether or not Chandrasekaran teaches "updating the virtual volume at runtime," which was the feature that was cited in the Office Action as the basis of the rejection under 35 U.S.C. § 103(a), incorporating it into Chandrasekaran would not result in the invention recited in amended Claim 1 as a whole, because of Chandrasekaran's failure to teach or suggest "the first tier objects have logical connections to both local second tier objects associated with a shared storage processor and to remote second tier objects associated with at least another storage processor."

Therefore, whether or not updating the virtual volume at runtime was obvious to one of ordinary skill in the art, incorporating it into Chandrasekaran would not result in the invention recited in amended Claim 1. Even assuming *arguendo* that it could be incorporated into Chandrasekaran, the Chandrasekaran system would not have the ability to provide first tier objects having logical connections to both local second tier objects associated with a shared storage processor and to remote second tier objects associated with at least another storage processor, as recited in Claim 1.

The burden is on the Patent Office to provide some tenable rationale as to *why* and *how* one of ordinary skill in the art would modify Chandrasekaran so as to arrive at the presently claimed methods recited in amended Claim 1. In the present case, however, no such rationale has been provided.

Therefore, Claim 1 is patentable over Chandrasekaran in view of Official Notice, as are directly or indirectly dependent Claims 2 - 29, for at least the same reasons.

Accordingly, a *prima facie* case of obviousness has not been established with respect to amended Claim 1, and Applicant respectfully requests that the rejection under 35 U.S.C. § 103(a) be withdrawn.

III. CONCLUSION

In view of the foregoing, it is submitted that Claims 1-29 are allowable and that the application is in condition for allowance. Notice to that effect is requested.

If the claims are not found to be in condition for allowance, the Examiner is requested to contact the undersigned to schedule an interview before the mailing of the Office Action. Any communication initiated by this paragraph should be deemed an Applicant initiated interview.

Respectfully submitted,

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